

NEW JERSEY STATE HIGHWAY DEPARTMENT

GLOSSARY OF TERMS

1966

DIVISION OF MATERIALS

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- * **A.A.S.H.O.** — The American Association of State Highway Officials, National Press Bldg., Washington, D. C.
- * **A.S.T.M.** — The American Society of Testing and Materials, 1916 Race St. Philadelphia, Pennsylvania

Abrasive Charge — The charge for the Los Angeles abrasion machine consists of cast-iron or steel balls about 1 7/8 in. in diameter and weighing between 390 and 445 grams each.

Absolute Humidity — Refers to the actual density of water vapor in the air, expressed in grains per cubic foot.

Absolute Weight — The weight of a unit volume of a material, if all the voids were actually filled by the material itself.

Absorption Test of Aggregates — This test is made by measuring the amount of water absorbed by the test sample in a definite length of time, usually 24 hours. The result is commonly expressed as a percentage of the oven-dry weight of the sample.

Accelerator — An admixture used to accelerate the setting of concrete.

Addition — A substance added to cement or bitumen to improve it in some way.

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Admixture—A substance added to P.C. Concrete or a Bituminous Mix to improve its characteristics.

Aggregate—The mineral material such as sand, gravel, shells, slag, or broken stone; or combinations thereof with which the portland cement or bituminous material is mixed to form a mortar or concrete.

Aggregate (In Soils)—Sometimes refers to material retained on the number 10 sieve.

* **Air Entrainment**—Small particles of air in a Portland Cement Mix induced by the addition of an air entraining agent. i.e. Neutralized Vinsol Resin.

Angular Fragments—A term referring to elongated particles of aggregate having flat faces, sharp edges, and corners. (See Flat)

* **Anhydrous (Salt)** As used in the accelerated soundness test, this term refers to Na_2SO_4 and MgSO_4 for sodium and magnesium sulphate respectively.

* **Ball Test**—“Kelley” ball method of testing Portland Cement Concrete workability. Placed on surface of poured concrete and settles by gravity. Depth of penetration is measured. Associated with slump.

Bin—As used in laboratory work, a storage receptacle for sand, gravel, stone. Term used with cement, a “lot.”

Binder—Bituminous cementitious material, asphalt or tar.

* **Bituminous Emulsion**—A liquid mixture in which minute particles of bitumen are held in suspension in water or a watery solution.

- * **Blast Furnace Slag**— The non-metallic product, consisting essentially of silicates and aluminosilicates of lime, which is developed simultaneously with iron in a blast furnace.
- * **Bleeding**— Portland Cement Concrete; free water which collects on horizontal surfaces. Bituminous; excess asphalt or tar on surfaces. (See Fatty)
- Borrow Material**— Soil aggregate borrowed from another location. Has a definite specification. May be referred to as fill material.
- * **Breaking of Emulsion**— The process of the separation of the bitumen from other constituents in a bituminous emulsion.
- Briquet**— A cement mortar test specimen having a cross-section of 1 in.
- Bulking**— The increase in volume in fine material such as sand, resulting from the presence of moisture, or an excess of voids due to lack of compaction.
- * **Calcium Chloride**— CaCl_2 used to accelerate setting of Portland Cement Concrete. Cold weather concrete work.
- * **Calcium Hydroxide**— A compound formed by the hydration of free lime or on hydrolysis of the portland cement compound C_3S . The formula is $\text{Ca}(\text{OH})_2$.
- * **Calcium Sulphate**— The usual retarder used to control the set of portland cement. This usually is in the form of gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ but occasionally is added as plaster $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ or anhydrite CaSO_4 .

Calcium Sulphoaluminate—A portland cement compound formed by the interaction of calcium sulphate and alumina compounds in solution. The continued formation of this compound due to the action of sulphate waters on cement may give rise to disintegration.

California Bearing Ratio—The force per unit area required to penetrate a soil with a 3 sq. in. piston (Approx. 2" in. diameter) at a rate of 0.05 inch per minute.

Calorimeter—An instrument for measuring heat of solution of portland cement.

Cement—Any cementitious material. In Highway work usually means Portland Cement. Other cements, asphalt, epoxy, glue, etc.

Clay—An impure anhydrous aluminum silicate. May lump in a field specimen and be found in Soil Aggregates. Is friable and when dry forms the bulk of fine particles passing the #200 mesh sieve. Excesses will cause "heaving" or swelling of surfaces particularly in winter.

X **Clinker**—The sintered product obtained in the manufacture of portland cement, which, when pulverized with the addition of calcium sulphate produces portland cement.

Coal—A carbonaceous substance formed from the remains of vegetation by partial decomposition. Hard—anthracite and soft bituminous.

Coal Tar—Bituminous material developed from the destructive distillation of bituminous coal. Common tar and coke are by-products. Sometimes called Gas House Tar.

Coarse Aggregate—Fragmental material which will not pass a number 4 sieve.

Coarse Sand (In Soils)—That material passing a number 10 sieve and retained on a number 60 sieve.

Compressive Strength—The resistance offered by a given surface. It is usually expressed in pounds per square inch. (p.s.i.)

Concrete (Portland Cement)—A mixture of portland cement, mineral aggregates and water, hardened by hydraulic chemical reaction.

Consistency—(1) P.C. Concrete, workability (2) General—The degree of fineness, density, viscosity or the like.

Core—A cylindrical specimen cut full depth of the pavement at the site.

Crushed Stone—The product resulting from the crushing of ledge rock, boulders or large cobblestone substantially all faces of which have resulted from the crushing operation.

Courses—

Base Course—Immediately under Top Course

Top Course—Surface course or riding surface.

Subbase—Top—Immediately under Base course.

Intermediate—Immediately under Subbase—Top Course. There may be more than one intermediate subbase.

Bottom—Immediately under intermediate or subbase Top—Course.

Subgrade—Usually the undisturbed subsoil but may be constructed on unstable soil.

Cubic-Foot Container—A cylindrical measure of 1 cu. ft. capacity, used in obtaining the unit weight of aggregates. The dimensions are as follows:

Inside diameter 14.00 in.
Inside height 11.23 in.

X **Curing**—Period necessary for Portland Cement Concrete to build up strength. Act of preserving moisture. i.e. Curing material; burlap, salt hay, polyethylene sheeting, resinous membrane.

X **Curing Material**—Liquid sprayed or painted on Portland Cement Concrete to retain moisture necessary to proper curing. Pigmented—white and clear (with dye).

Cut-back Products—Petroleum or tar residuums which have been fluxed with distillates.

Cycle—In the accelerated soundness test for aggregates a complete cycle consists of one immersion or soaking period and one drying period. Repetition of a process or phase of testing.

Cylinder—A test specimen made of plastic material in cylindrical form. Generally height is twice the diameter.

Delimeter—An apparatus, operated on dry cell batteries, used to determine the applied load when molding briquets.

Density—The ratio of the mass or weight of a material to its volume (2) stupidity.

Density (of Sub-base)—Has to do with field compaction on the grade. The relationship of moisture and density of soil aggregates. Measured in the field with an inverted sand-cone device.

Deval Abrasion Machine—The machine consists essentially of a hollow iron cylinder, closed at one end and fitted with a tightly fitting iron cover at the other. The cylinder is 20 cm. in diameter and 34 cm. in depth inside. The cylinder is mounted on a shaft at an angle of 30 degrees with the axis of rotation of the shaft.

Diamond Core Drill—A drill, usually power driven, used in obtaining a core from ledge rock for testing purposes. The crown of the drill is set with bortz and drills specimens 1 in. in diameter for the toughness test or 2 in. in diameter for the compression test.

Dicalcium Ferrite—An iron compound in portland cement which may be formed in the presence of an excess of Fe_3O_3 .

X **Dolomite**—A magnesian limestone composed essentially of the mineral dolomite, a double carbonate of calcium and magnesium. It is theoretically composed of 54 per cent calcium carbonate and 46 per cent magnesium carbonate.

Dorry Hardness Test (Of Rock)—Hardness is determined by subjecting a cylindrical, rock core 25 mm. in diameter, drilled from the specimen to be examined, to the abrasive action of quartz sand fed upon a revolving steel disk. The end of the specimen is worn away in inverse ratio to its hardness and the amount of loss is expressed in the form of a coefficient as follows:

Coefficient of harness = $20 - \frac{1}{3} W$,
where W equals the loss in weight after 1,000 revolutions of the disk.

Dry Bulb Temperature—Temperature of the air as indicated by a standard thermometer.

Dry Loose—A term used in describing the unit weight of aggregate. In this case the aggregate is placed in a cubic foot container until overflowing, then the top is struck off level. The aggregate is not tamped in any way.

X **Dry Rodded**—A term used in describing the unit weight of aggregate. In this case the aggregate is placed in a cubic-foot container in three layers, with each layer being tamped 25 times with a metal tamping rod.

X **Ductility (Of Bituminous Materials)**—Is commonly measured by the distance to which it will elongate before breaking when two ends of a briquet of the material are pulled apart at a specified speed and at a specified temperature.

X **Elutriation Test**—A determination of the total quantity of silt, loam, clay, etc., finer than the number 200 mesh sieve, in sand and other fine aggregates. The test is usually made by washing the sample over a number 200 sieve, and drying the residue. The percentage of silt, loam, and clay equals:
Original dry weight—Weight
after washing

$$\frac{\text{Weight after washing}}{\text{Original dry weight}} \times 100$$

X **Emulsion**—A combination of water and an oily material made miscible with water through the action of saponifying or other agents. i. e. soap.

False Set—Premature set of Portland Cement with little heat developed. Will become plastic if reworked immediately with additional water.

Fine Aggregate—See sand.

Fine Sand (In Soils)—That material passing a number 60 sieve and retained on a number 270 sieve.

Fineness—Surface Area of Portland Cement.

Expressed in square centimeters per gram, is determined by the Blaine (air permeability) and Wagner Turbitimeter (photo electric cell measurement of particles suspended in solution) Surface Area = x sq. cm. per gram.

✕ **Fineness Modulus**— In the case of aggregates for concrete, an empirical factor obtained by adding the total percentages of a sample of the aggregate retained on each of a specified series of sieves, and dividing the sum by 100. The sieves are: Nos. 100, 50, 30, 16, 8, 4, 3/8 in., and 1½ in.

✕ **Flash Point**— The flash point of an asphaltic product is the temperature at which, during heating, its evolved vapors will temporarily ignite or flash when a small flame is brought in contact with them.

Flash Set or Quick Set of Portland Cement—

A cement which sets very rapidly after the addition of water. Develops considerable heat and cannot be reworked.

Flat and Elongated Particles— A term referring to aggregate particles which are flat and wide with sharp edges.
(See Angular Fragments)

Flour (In Cement)— The impalpably fine portion of portland cement.

Flow Table— A laboratory apparatus for determining the consistency of mortar or concrete. It consists essentially of a circular bronze plate of a definite diameter, so mounted that the surface is level, and equipped with a mechanism for raising the plate a given height and allowing it to fall without cushioning. A bronze cone of a definite height and diameter rests on top of the table, and is filled with mortar or concrete.

✓ **Flux Oil**—Oils used for the purpose of softening bituminous materials.

✓ **Fluxes**—Bituminous materials generally liquid, in which the predominating constituent is bitumen, used in combination with asphalts for the purpose of softening the latter.

Foreign Matter—Any material not consistent with the material considered. In aggregates foreign stone or gravel (in crushed stone), glass, coal, wood, roots, etc.

✓ **Free Lime**—Calcium oxide (CaO) which remains uncombined in portland cement clinker due either to excess lime in the mixture or to underburning.

Gage Points—Short pieces of stainless steel, glass rods, capillary tubes, or similar devices placed in mortar or concrete specimens and used in determining the volume change of the mortar or concrete.

Gillmore Needles—Apparatus used to determine the time of set of cement, and consisting of two needles, one weighing $1/4$ lb. (for initial set) and the other 1 lb. (for final set).

Glacial Gravel—Rock material transported by a glacier and deposited by or from the ice or by or in water derived from the melting of the ice.

Gneiss—A medium or coarse-grained crystalline rock possessing some form of parallel structure due either to the uniform orientation of certain tabular or prismatic minerals, or to the presence of wavy discontinuous surfaces in a lenticular structure, or of bands of varying mineralogical composition which retain their continuity and parallelism throughout a considerable mass of rock.

✕ **Gram**—A metric unit of weight equal to 0.0022 lb.

Granite—A granular igneous rock composed essentially of quartz, orthoclase or microcline, and mica. Commonly a part of the feldspar is plagioclase. The mica may be either biotite or muscovite or both. Hornblende is a common, and augite an uncommon, component. Apatite, zircon, and magnetite are also usually present.

✕ **Gravel**—The coarse, granular material, resulting from the natural erosion of rock; and which is retained on a number 4 or $\frac{1}{4}$ sieve. Particles usually rounded.

Heat of Hydration—Refers to the heat evolved during any given time period following the mixing of cement with water.

Heat of Solution—The heat evolved when a material is dissolved in any specified solution.

Hydration—A combination of a compound with water to form a hydrate.

✕ **Hydrated Lime**—A dry powder obtained by treating quicklime with water enough to satisfy its chemical affinity under the conditions of its hydration. It consists essentially of calcium hydroxide or a mixture of calcium hydroxide and magnesium oxide and magnesium hydroxide.

Hydraulic Cement—Cement which sets under water. The rock which on being calcined and ground very fine, yields, this type of cement and should contain in addition to lime certain proportions of alumina, silica and magnesia. A little iron is also present.

Hygrometer—Any properly calibrated instrument which indicates directly, or indirectly, the relative humidity of the air.

X **Hydrolysis**—The interaction of a compound with water as a result of which the compound is broken down into basic or acidic constituents or both. In cement chemistry this refers principally to the interaction of C_3S with water which results in the formation of calcium hydroxide and a less basic calcium silicate hydrate.

X **Hydrometer**—A float of which the depth of immersion indicates the specific gravity of a liquid.

X **Hydrometer Analysis**—Separation of fine material by dispersion and settlement. Material passing the .05 mm. sieve and includes material smaller than the .005 mm. sieve.

Igneous Rocks—Rocks formed by solidification from molten magma, and are commonly divided into two great classes, namely: plutonic and volcanic. Some examples are granite, trap.

In-place Mix—Mixed on the site, in place.

Inert Material—Components of a mixture which have no binding or cementitious properties. Do not chemically combine.

Internal Interlock (Of Soils)—Is the resistance to motion caused by the roughness of the surface and the shape and size of the individual particles in the soil; that is, the resistance to motion of the particles over each other.

✕ **Kilogram**—A metric unit of weight equal to 35.273 ounces or 1,000 grams.

Knapping—The act of breaking rock with hammers or sledges. Associated also with prisons.

Laboratory—A building or a room equipped with suitable standard apparatus for making physical and chemical tests on road-building materials.

✕ **Laitance**—A thin layer of inert material which collects on the surface of port-land cement concrete or mortar after being placed.

Lake Asphalt—Refers to native asphalt found in the form of lake deposits such as Bermudez and Trinidad.

Le Chatelier Flask—A specially designed stoppered flask of about 275 ml. capacity and used in determining the specific gravity of cement, sand, and other fine non-bituminous materials.

Ledge Rock—The true bedrock, as distinguished from boulders or rock crushed by artificial means.

✕ **Light weight Aggregate**—Used to make lightweight concrete. Expanded shale, clay or slag.

Lignite—A brownish-black coal in which the alteration of vegetal material has proceeded further than in peat but not so far as sub-bituminous coal.

✕ **Limestone**—Any natural rock of sedimentary origin composed chiefly of calcium carbonate or of calcium and magnesium carbonates in either its original chemical or fragmental or re-crystallized form.

* **Lithological Count (Of Gravel)**—A method for determining the percentage composition of gravel. About 150 pieces of gravel are selected, ranging in size from $\frac{1}{2}$ in. to 2 in., and then separated into the various types of material such as granite, diorite, sandstone, quartzite, limestone, etc.

Los Angeles Rattler—A machine for determining the abrasive resistance of coarse aggregate. The machine consists essentially of a cylindrical drum 28 in. in diameter and 20 in. in length.

Magnesium Sulphate—The salt either the anhydrous (MgSO_4) or crystalline ($\text{MgSO}_4 \cdot 7 \text{H}_2\text{O}$) used in making the magnesium sulphate test for soundness of aggregates.

Marble—Any crystalline or micro-crystalline natural rock deposit of sedimentary origin composed chiefly of calcium carbonate or calcium and magnesium carbonates.

* **Matrix**—The medium that surrounds or unites the constituents of an aggregate. For example, the mortar would be considered the matrix that binds the coarse aggregate in concrete.

Mechanical Analysis (Of Soils)—May be defined as a grading by dry weight of the grain particles obtained by using a combination of sieves down through the number 270 and hydrometers (sedimentation to 0.001 mm.)

Mesh—The square opening of a sieve.

Metamorphic Rocks—Are those which have been changed by temperature, pressure, and chemical fluids into new forms being more stable under the new conditions. Some examples are schists, gneisses, marble, etc.

* **Micron**—A linear unit equal to one-thousandth of one millimeter.

* **Milliliter**—A metric unit of volume equivalent to 0.0393 fluid ounces; 0.001 liter; or 1.000027 cubic centimeter.

* **Millimeter**—A metric unit of length equivalent to 0.0393 in.; 0.001 meter; 0.1 centimeter; or 100⁰ microns.

Mineral Filler—Consists usually of limestone dust, or other inert material. Used in sheet asphalt and bituminous concrete pavements.

Mortar—(1) a material used in a plastic state, which can be troweled, and becomes hard in place, to bond units of masonry structures; (2) a mixture of cement and sand with water added.

Mortar Sand—Sand for use in mortar usually consists of hard, durable uncoated mineral or rock particles, free from injurious amounts of organic or other deleterious matter, and should pass the 3/8 sieve.

Natural Asphalt—Asphalt occurring as such in nature.

Organic Material—In aggregates, wood, chips, roots, leaves. Characterized by dark brown color in water.

Organic Matter Test—This test is made on sand and consists essentially of adding a definite amount of 3 per cent NaOH solution to a definite amount of sand and allowing the mixture to stand for 24 hours. At the end of this time the color of the solution is compared with color standards to determine whether or not organic substances are present in the aggregate.

* **Oven-dry**—A term commonly applied to aggregates which have been subjected to a temperature of about 100°C. in an electric or gas-fired oven.

Paste—Portland Cement and water.
Sometimes referred to as "Neat Cement".

Paving Brick—A hard burned vitrified clay unit for use in pavements with physical qualities that will meet the requirements of standard specifications. The sizes average about $2\frac{1}{2}$ in. x 4 in. x $8\frac{1}{2}$ in.

* **Penetration (Of Bituminous Materials)**

—Is defined as the consistency of a bituminous material, expressed as the distance that a standard needle vertically penetrates a sample of the material under known conditions of loading, time, and temperature. Where the conditions of test are not specifically mentioned, the load, time, and temperature are understood to be 100 grams, 5 seconds, 25° C. (77° F.) respectively, and the units of penetration to indicate hundredths of a centimeter.

* **Percolation (In Soils)**—The movement of water through soil caused by gravity.

Photoelectric Cell—An electric cell actuated by a source of light. The intensity of the current generated is proportional to the intensity of the beam.

* **Plasticity Index (Of Soils)**—Is usually defined as the liquid limit minus the plastic limit.

Polarized Light—Light vibrating in one plane. Used in connection with study of thin sections of cement and/or rock.

Portland Cement—The product obtained by finely pulverizing clinker produced by calcining to incipient fusion an intimate and properly proportioned mixture of argillaceous and calcareous materials.

Preece Test—Determination of effective galvanizing treatment of wire and other surfaces.

Proctor Test—Compaction test on Soil or Soil aggregate. Unit weight at optimum moisture under a certain compactive effort is determined.


Pycnometer—A calibrated bottle used for measuring the volume and weight of a liquid in determining its specific gravity; a small calibrated bottle for determining the specific gravity of grains or small fragments.

Quartering—The method of reducing the size of a test sample by dividing it into four parts and rejecting alternate quarters. This process is continued until the sample is small enough for the necessary tests.

Refined Tar—Tar freed from water by evaporation or distillation which is continued until the residue is of desired consistency; or a product produced by fluxing tar residuum with tar distillate.

Reinforced Concrete—Concrete in which metal is imbedded in such a manner that the two materials act together in resisting forces.

Relative Humidity—Ratio of actual density (or pressure) of existing vapor, to maximum possible density (or pressure) at the same temperature, expressed as a percentage.

 **Retarder**—A compound, usually some form of calcium sulphate, added to portland cement during manufacture to control the rate of set. (2) A solution added when concrete is mixed to retard the initial and final set. Slows hydration.

Rock Asphalt—Sandstone or limestone naturally impregnated with asphalt.

Rounded Fragments—A term referring to particles of aggregate having the corners and edges rounded. i. e. Gravel.

Sample—A part of a material presented as evidence of the quality of the whole.

Sand—The fine granular material, usually passing the number 4 sieve, resulting from the natural disintegration of rock, or from the crushing of friable sandstone rock.

Sandstone—A typical sandstone is composed essentially of rounded grains of quartz, with interstitial cementing material, with the larger grains tending to be more perfectly rounded than the smaller ones.

Schists—A crystalline rock that can be readily split or cleaved because of having a foliated or parallel structure, generally secondary and developed by shearing and recrystallization under pressure.

Screen—In laboratory work, an apparatus in which the openings are round. Used for making screen analyses of aggregates.

Sedimentary Rocks—Are those formed by deposition of the solid material that has been carried by natural agencies of transportation to some point where they have been redeposited. Examples are: sandstone, limestone, shale, etc. Formed by pressure. Usually layered.

Set—The stiffening of cement paste following the mixture with water.

Shale—A material composed essentially of silica and alumina, which has in addition, a more or less thinly laminated structure. This structure has been impaired by the natural stratification of extremely fine sediments by pressure.

Shear (In Soil)—May be defined as the resistance to lateral movement produced by a given vertical load.

Shrinkage Limit—In soil technology, the moisture content, expressed as a percentage of the dry weight, required to fill the pores of a soil sample which has been dried to constant weight from a moisture content sufficient in amount to fill the soil pores completely.

Sieve—In laboratory work, an apparatus in which the openings are square. Used for making sieve analyses of aggregates.

Silt—Consists of the finer particles of rock substance and ranges in size from 0.05 to 0.005 mm.

Silt (In Soils)— That material passing a number 270 sieve having a grain diameter of greater than 0.005 mm.

Slate— An argillaceous rock in which fissility has been developed by pressure.

Sling Psychrometer— A psychrometer containing matched dry and wet bulb thermometers suitably mounted for swinging through the atmosphere, for simultaneously indicating dry and wet bulb temperatures. The thermometers shall be so mounted as to act independently and to face the air current during the swinging. Used to determine the relative humidity.

Slump— The vertical distance which concrete subsides from its molded cone. It is a test of consistency of concrete.

Sodium Hydroxide— The chemical Na(OH) used in making the organic matter test on sands.

* **Sodium Sulphate**—The salt, either anhydrous (Na_2SO_4) or crystalline ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$) is used in making the sodium sulphate test for soundness of aggregates.

Soil Aggregates—Large group of materials used for subbase courses. Sands, road gravel, quarry process stone, etc.

* **Soil—Cement**—Used as stabilized base course. Approximately 1 part cement to 10 parts soil aggregate by weight.

Soil Fines—Is defined as that fraction of soil passing the number 40 sieve.

Soundness of Aggregates—Sodium or Magnesium Sulphate test or freeze-thaw tests. Cement—10" x 10" x 1" neat cement bar which must indicate limit of expansion or contraction after being autoclaved.

Specific Gravity—Weight of a material compared to an equal volume of water at the same temperature. Determined by hydrometer, pycnometer, displacement of water.

Stability of Emulsion—The resistance to separation of the oily material from the water.

Stabilization—Addition of one of several cementitious materials to base materials to give better stability. In-place or plant mix.

* **Standard Ottawa Sand**—A natural sand from Ottawa, Illinois, screened to pass the number 20 sieve and retained on the number 30 sieve. This sand is used as a standard of comparison in testing cement and fine aggregate.

Standard Temperature (Testing)—77° F (25° C) for most bituminous materials. 73.3 F \pm 3° F for cement and concrete.

Stone Chips—Small angular fragments of stone containing no dust.

Strength—Resistance to compression, pulling (tensile). Flexural—load applied to a beam supported on each end.

Subangular Fragments—A term referring to particles of aggregate having blunt or slightly rounded edges and corners.

Surface Area—The overall surface of a pulverized material usually expressed in cement technology as square centimeters per gram.

Tamping Rod—Used in determining the unit weight of aggregates. The rod is usually 5/8 in. in diameter and 24 in in length, with one end rounded to a 5/8 in. hemispherical tip.

Tars—Black to dark brown bituminous condensates which yield substantial quantities of pitch when partially evaporated or fractionally distilled, and which are produced by destructive distillation of organic material such as coal, oil, lignite, peat and wood.

Tensile Strength—The resistance offered by a given cross section to a pulling force. It is usually expressed in pounds per square inch.(p.s.i.)

Test (Of a Material)—A critical examination by accepted standard test methods or methods devised.

Testing Machine — A mechanical device for applying a load (force) to a specimen, or making a determination.

✱ **Thief**—Tube for sampling sand, 2" diam. x 4 ft. long.

Trap Rock—Includes the dark-colored fine-grained and dense igneous rocks composed essentially of the ferro-magnesian minerals, basic feldspars, and little or no quartz.

✕ **Tricalcium Aluminate (C_3A)**—One of the alumina compounds in portland cement. Gives off a large amount of heat on hydration and reacts with sulphates in solution to form calcium sulhoaluminate.

✕ **Tricalcium Silicate (C_3S)**—The principal compound of portland cement and the one chiefly responsible for strengths at early ages.

Turbidimeter—An instrument which measures the intensity of light passing through a given suspension. Such an instrument is used for measuring the specific surface of cements inasmuch as the intensity of light passing through a suspension of cement is proportional to the specific surface.

Unit Weight of Aggregate—This test consists of determining the weight of the material which will occupy a cubic foot. The unit weight may be expressed either as dry, loose or dry, rodded.

Vapor Pressure—Component of atmospheric pressure caused by the presence of water vapor, usually expressed in inches of mercury.

Vertical Illumination—The illumination of a microscopic specimen by reflected light. Used in the study of thin sections of cements and rocks.

Vibrator—Device used to jar Portland Cement concrete into forms or around reinforcing rods.

Vicat Test—A method of determining the initial and final set of Portland Cement.

Viscosity — The measure of the resistance to flow of a bituminous material, usually stated as the time of flow of a given amount of the material through a given orifice.

Vitrify — To harden by fussion, as vitrified clay pipe or drain tile. A glaze.

Voids — The spaces or openings between particles of a material in mass.

Volume Change (Of Soils) — Is a term used to indicate the expansion and contraction of soils as the water content changes.

Washing — Usually refers to a method of removing the fines (passing the #200 mesh sieve) from soil aggregate gravels, or bituminous mixtures.

Water—Cement Ratio — The ratio of the weight (or volume) of the water to the weight (or volume) of the cement in mortar or concrete mixes. Usually calculated on a basis of 1 cubic foot of cement (1 bag). Example $w/c = .503$ cu. ft. of water per bag.

✱ **Water Reducer** — A solution added when concrete is being mixed to plastecize the mix. This will make possible a reduction in water—cement ratio.

Water Gas Tars — Tars produced by cracking oil vapors at high temperatures in the manufacture of oil gas.

Weathering Test (Of Aggregates) — These tests usually consist of subjecting the material to sodium sulphate, or magnesium sulphate soundness tests; or to alternate freezing and thawing. Such tests simulate the natural weathering agencies.

Workability (Of Concrete) — That property which is inversely proportional to the effort required to place concrete to obtain a uniform product.

Yield — The factor obtained by dividing the volume of the resulting concrete by the volume of the aggregate mixed.

ABBREVIATIONS

- Abbreviations should be used only in field or laboratory notation.
- They are used on a report only where space is limited. Clarity should never be sacrificed.
- They are never used in an essay type report except to express a quantity.

A. C. — Asphalt Cement

agg. — Aggregate

Ave. — Avenue

ave. — average

bbl. — barrel

Blvd. — Boulevard

B.P.R. — Bureau of Public Roads

Br. — Bridge

° C — degrees Centigrade

C.A.B.C. — Coarse Aggregate Bituminous
Concrete.

C.B.R. — California Bearing Ratio

c.c. — cubic centimeter(s)

c.f. — cubic foot (feet)

cm. — centimeter

Cu. ft. — cubic foot (feet)

Cu. yd. — cubic yard (s)

cyl. — cylinder

Dol. — Dolomite

Engr. — Engineer
° F — degrees Fahrenheit
F.A.B.C. — Fine Aggregate Bituminous Concrete.
ft. — foot — feet
gal. — gallon (s)
Gl. — gravel
gm. — gram (s)
Gn. — Gneiss
Gran. — Granite
K.U. — Krebs units
lb. — pounds (s)
lb./sq. ft. — pounds per square foot
lb./cu. ft. — pounds per cubic foot
lb./sq. yd. — pounds per square yard
lb./cu. yd. — pounds per cubic yard
L.S. — Limestone
M.A.B.C. — Medium Aggregate Bituminous Concrete.
max. — maximum
min. — minimum
ml. — milliliter
mm. — millimeter
mu. — millimicron
Nom. — Nominal
O.A. — Oil (Petroleum) Asphalt
opt. — optimum
oz. — ounce (s)
P.C. — Portland Cement
P.I. — plasticity index
P.O. — Purchase Order
p.s.i. — pounds per square inch.
qt. — quart
Rd. — road
Reg. — Request
Rt. — Route
S.A. — Sheet Asphalt
sd. — sand

Sect. — Section
Spec. — Specification (s)
Sp. Gr. — Specific Gravity
Sq. ft. — square foot (feet)
Sq. yd. — square yard (s)
St. — street
Sta. — station
T.R. — Trap Rock
Wt. — weight

SYMBOLS

π — pi = 3.1416
 c/o — care off
 $\%$ — per cent
 CL — center line
 $/$ — per or with

COMMONLY USED VALUES

Liquid Volumes:

Gallon = 4 quarts = 128 fluid ounces
 Quart = 2 pints = 32 fluid ounces
 Pint = 16 fluid ounces

Depth — Thickness

1 inch = 2.54 cm.
 1 Mil = 0.001 inch.

Weight of Solids (Mass)

Pound = 16 ounces = 454 grams
 Ton = 2000 pounds
 Kilogram = 1000 grams

Water Relationships

- 1 gallon weighs 8.33 pounds
- 1 cubic foot weighs 62.4 pounds
- 1 cubic foot equals 7.48 gallons
- 1 sq. yd. x 1 inch depth = 46.8 lbs.

Temperature Conversion

From Fahrenheit to Centigrade:

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \div 1.8 = ^{\circ}\text{C}$$

From Centigrade to Fahrenheit

$$^{\circ}\text{F} = (^{\circ}\text{C} \times 1.8) + 32 = ^{\circ}\text{F}$$

Asphalt Liquid

Gallon weighs 8.5 pounds

Asphalt Concrete Courses

- 1 sq. yd. x 1 inch depth, weight of:
 - Top Course — 110 — 120 pounds
 - Bottom Course — 110 — 120 pounds

Asphalt Stabilized Base Course

- 1 sq. yd. x 1 inch depth, weight of:
 - Gravel Stab. Base 100 — 110 pounds
 - Stone Stab. Base 110 — 120 pounds

Portland Cement

- bag or sack = 94 pounds
- bag or sack = 1 cubic foot
- barrel = 4 bags or sacks
- Voids = 52 % (approximately)
- Solids = 48 % (approximately)

Portland Cement Concrete

- 1 cubic foot = 142 — 150 lbs.
- 1 square yard x 8 inch depth
weighs 840 to 900 pounds
- 1 cubic yard will pave approximately
35 sq. ft. at an 8" depth.

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